

United States Army Corps of Engineers
New England District

Final Debris Removal Activities Summary Report

**Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation
Devens, Massachusetts**

Contract No. W912WJ-19-D-0014

Contract Delivery Order No. W912WJ-21-F-0060

December 2023

Final Debris Removal Activities Summary Report

**Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation
Devens, Massachusetts**

December 2023

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CERTIFICATION

I hereby certify that the enclosed Report, shown and marked in this submittal, is that proposed to be incorporated with Contract Number W912WJ-19-D-0014. This document was prepared in accordance with the U.S. Army Corps of Engineers (USACE) Scope of Work and is hereby submitted for Government approval.

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Acronyms and Abbreviations

AOC	area of contamination
Army	United States Department of the Army
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EM	electromagnetic
GPR	ground penetrating radar
HRGS	Hager-Richter Geoscience, Inc.
S-A JV	SERES-Arcadis 8(a) JV 2, LLC
Tantara	Tantara Corporation
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
Work Plan Addendum	Debris Removal Work Plan Addendum

1 Introduction

The SERES-Arcadis 8(a) JV 2, LLC (hereafter referred to as the S-A JV) is submitting this Debris Removal Activities Summary Report to document the removal of surficial debris previously identified at Area of Contamination (AOC) 50 (Former Moore Army Airfield; **Figure 1**). This work was conducted in accordance with the Debris Removal Work Plan Addendum (Work Plan Addendum) prepared by S-A JV on behalf of the United States Army Corps of Engineers (USACE; S-A JV 2023). The S-A JV has prepared this Debris Removal Activities Summary Report on behalf of USACE under Contract Number W912WJ-19-D-0014, Contract Delivery Order Number W912WJ-21-F-0060.

2 Background

On March 30, 2020, two previously identified debris areas in AOC 50 (identified as “Debris Pile A” and “Debris Pile B”) were observed to contain assorted empty metal drums, containers, and paint cans (**Figure 2**). The United States Department of the Army (Army) completed removal of these debris piles between November 29, 2021, through December 1, 2021, and the results are summarized in the Final Debris Removal Activities Report (S-A JV 2022).

As the Army was demobilizing from the site, a third debris pile was identified north of the Airfield, which was referred to as Debris Pile C. The Army notified the United States Environmental Protection Agency (USEPA) and Massachusetts Department of Environmental Protection of the additional debris pile by email on December 14, 2021. This report summarizes the removal activities associated with Debris Pile C, which were conducted in accordance with the Work Plan Addendum (S-A JV 2023). The area encompassing Debris Pile C is shown on **Figure 3**.

3 Field Activities Summary

The following tasks were performed to investigate and remove the identified debris areas:

1. Clearing vegetation as necessary to conduct the work
2. Removing debris identified at the ground surface
3. Performing confirmatory geophysical survey
4. Investigation-derived waste management

In accordance with the provisions of the Work Plan Addendum, the work was performed in compliance with an approved Accident Prevention Plan and Site Safety and Health Plan with site-specific activity hazard analyses. The S-A JV followed the standard operating procedures provided in the Work Plan Addendum (S-A JV 2023).

3.1 Initial Site Walk

On December 19, 2022, representatives of the S-A JV conducted a site walk, along with representatives of Tantara Corporation (Tantara) of Marlboro, Massachusetts, to locate the surficial debris and to evaluate the equipment required to remove the debris. Within the area identified as Debris Pile C, the field inspection team

walked in all directions to determine the surficial and visual extent of the debris. Debris that was observed was logged using a handheld Trimble Geo 7x Global Positioning System unit.

3.2 Debris Removal Activities

Representatives of the S-A JV and Tantara mobilized to the site on June 20, 2023, to conduct a pre-removal site walk of the debris removal area. Debris removal activities were conducted on June 21, 2023, and June 22, 2023. No indications of contamination, including evidence of staining, odors, or vegetation stress, were observed during the debris removal activities – this included the debris itself, as well as the soil around and beneath the removed debris. Therefore, no confirmatory soil sampling was conducted during the debris removal activity.

3.2.1 Debris Staging Area

A debris staging area was established within AOC 50 adjacent to a gated access point. At the end of each day, collected debris items were transported to a truck-mounted container located northeast of AOC 50 in a paved parking lot off of Fitchburg Road (**Figure 3**).

3.2.2 AOC 50, Debris Pile C Removal

Debris removal at Debris Pile C was conducted on June 21, 2023, and June 22, 2023. **Table 1** presents a summary of the debris removed. **Figure 3** shows the location and type of debris removed. Field photographs displaying the debris removed are provided in **Appendix A**.

During the debris removal process, periodic measurements of air quality were conducted using a RAE Systems MultiRAE Plus air quality monitoring instrument. No anomalous air quality readings were indicated within the ambient worker breathing zone or within and beneath removed debris material. Several 55-gallon metal drums and smaller containers were included in the debris removal activity. In general, these containers were found to be rusted through and not intact, or otherwise empty. Other collected debris consisted primarily of small empty metal containers and cans (1-gallon or less), metal fence posts, metal strapping material, discarded wiring/conduit materials, light bulbs, unidentified machine parts, metal trays, and air handling duct work.

During the removal process, four metal ammunition cans and what appeared to be an expired smoke cannister, were observed on the ground surface (identified as MD-4; see **Figure 3**). The Ft. Devens Fire Department Chief was notified to visually inspect the items. The Ft. Devens Fire Department Chief then notified the Massachusetts State Police explosives team to inspect the items. The explosives technician inspected the items and performed a field x-ray of the ammunition boxes which appeared to be filled with concrete. The items were determined to be inert and safe for disposal, and the items were removed.

Removed materials such as rusted and/or empty drums, oil cans, and other miscellaneous containers were visually inspected for contents prior to removal. Individual containers were also screened for organic vapors using a RAE Systems MultiRAE Plus air quality monitoring instrument, calibrated to register concentrations of common industrial organic chemicals in air/soil. No detectable organic vapors were noted at any of the container locations, and no container contents were available to be sampled for confirmation purposes. Soil in the vicinity of the removed containers were visually inspected and checked for organic vapors at the ground surface beneath the container. No visual soil staining, odors, or detectable organic vapors were identified.

3.2.3 Site Restoration

After the removal of surficial debris was completed in AOC 50, it was determined that no site restoration was required. In preparation for the post-removal geophysical survey, certain areas containing non-metal debris, broken brick, and deadfall small trees were consolidated to improve access for the geophysical survey equipment.

3.3 Geophysical Survey

Geophysical survey activities were conducted by Hager-Richter Geoscience, Inc. (HRGS) of Atkinson, New Hampshire, on July 27, 2023. The objective of the geophysical survey was to identify potential buried debris remaining after the surficial debris removal. The survey methods included ground penetrating radar (GPR) and electromagnetic (EM) induction techniques. The geophysical survey report is included in **Appendix B**.

3.3.1 Vegetation Clearing

The geophysical survey boundaries were identified based on observations made during debris removal activities. Prior to conducting the survey, grid boundaries were flagged indicating the approximate extent of the geophysical survey. Limited vegetation clearing within the geophysical survey boundaries was performed as necessary to provide a clear working area and minimize health and safety hazards. Branches approximately 1 inch or less were cut using hand tools. Cut vegetation and fallen branches were removed from the work area and set aside.

3.3.2 Geophysical Survey

The geophysical survey consisted of GPR to identify potential subsurface metallic and non-metallic anomalies and EM to identify shallow subsurface metallic objects. HRGS utilized a GSSI SIR4000 digital subsurface imaging radar system for the GPR survey and a Geonics EM61-MK2 time domain electromagnetic induction metal detector for the EM survey. Photographs of the equipment are presented in **Appendix A**.

The geophysical survey was conducted at eight debris locations in Debris Pile C. A total of seven debris locations were not surveyed. Five debris locations (hillside debris piles area, C-5, MD-3, MP-1, and MP-2) were not surveyed due to the steep terrain, two debris locations (C-4 and DR-1) were not surveyed due to the presence of ground nesting bees which swarmed on approach, and two debris locations (MD-1 and C-2) were not surveyed as they were single-item debris locations. Within each geophysical survey grid, GPR and EM were conducted in approximately 5-foot by 5-foot transects. No GPR data were acquired at Grid Area DR-2 due to the steep terrain, and no EM data were acquired at Grid Area MD-2 due to the chain-link fence along the western edge of the grid area. The transects were marked in the field using pink pin flags and/or spray paint. The geophysical grid locations are shown on **Figure 3**.

A copy of the HRGS geophysical survey report is included as **Appendix B**. HRGS conclusions include:

- Seven areas of buried metal objects or caches of objects are present in Grid Area DB-1, Grid Area C-3, Grid Area DR-2, and Grid Area C-1 (**Figure 3**). The nature of the objects could not be determined based on the geophysical data.
- Grid Area C-3 (subarea), Grid Area MP-3, Grid Area MD-2, and Grid Area Ammunition Cans (**Figure 3**) have no significant amounts of buried metal.
- Small unidentified buried objects and possible utility segments or linear structures are present in the grid areas.

The HRGS geophysical survey report provides several additional figures (**Appendix B, Figures 3 through 6**) which provide graphic depictions of the field survey findings used in the results interpretation and conclusions.

3.4 Investigation-Derived Waste Management

Based upon the field screening assessment described in Section 3.2.2, the surficial material collected during the removal process was determined to be non-hazardous and suitable for disposal at a regulated facility accepting non-hazardous waste. For the previous debris removal conducted, USACE contacted Mr. Conor O'Brien, the USEPA Region 1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Off-Site Rule point of contact, via email on December 6, 2021, to confirm that, since the debris did not contain contaminants or hazardous substances, it was not subject to the CERCLA Off-Site Rule. Mr. O'Brien confirmed that the debris was not subject to the CERCLA Off-Site Rule via email on December 7, 2021, and the debris was transported by Tantara to the Devens Recycling Center in Devens, Massachusetts, for disposal/recycling. The same management method was used for the removal conducted in June 2023. On June 22, 2023, 0.48 tons of debris were transported by Tantara to the Devens Recycling Center in Devens, Massachusetts, for recycling. A copy of the December 7, 2021 email from Mr. O'Brien and recycling center weight slip is included as **Appendix C**.

4 Conclusions

Debris removal activities were completed from AOC 50 Debris Pile C between June and July 2023 in accordance with the Work Plan Addendum (S-A JV 2023). Removed debris consisted of a mixture of metal containers ranging in size from soup cans, 1-quart oil cans, 1-gallon paint cans, to 55-gallon drums. Other metal debris included fence posts, lengths of piping, metal wiring, sheet metal, and miscellaneous equipment parts. There was no observed evidence of ground staining, stressed vegetation, odors, or free liquids within the recovered containers; therefore, no environmental sampling was conducted. Approximately ½-ton of debris was collected and disposed of during this removal activity. In general, the debris was observed to be random in nature and likely to have come from overbank disposal from the upper developed property area. Given the rusted appearance of much of the metal debris, the disposal is likely to have occurred many years prior. The objectives of the Work Plan Addendum (S-A JV 2023) were achieved and no additional actions are recommended.

5 References

- S-A JV. 2022. Final Debris Removal Activities Report, Areas of Contamination 50, 57, and 74, Former Fort Devens, Massachusetts, Contract No. W912WJ-19-D-0014. May.
- S-A JV. 2023. Debris Removal Work Plan Addendum, Area of Contamination 50, Former Fort Devens Army Installation, Devens, Massachusetts, Contract No. W912WJ-19-D-0014. March.

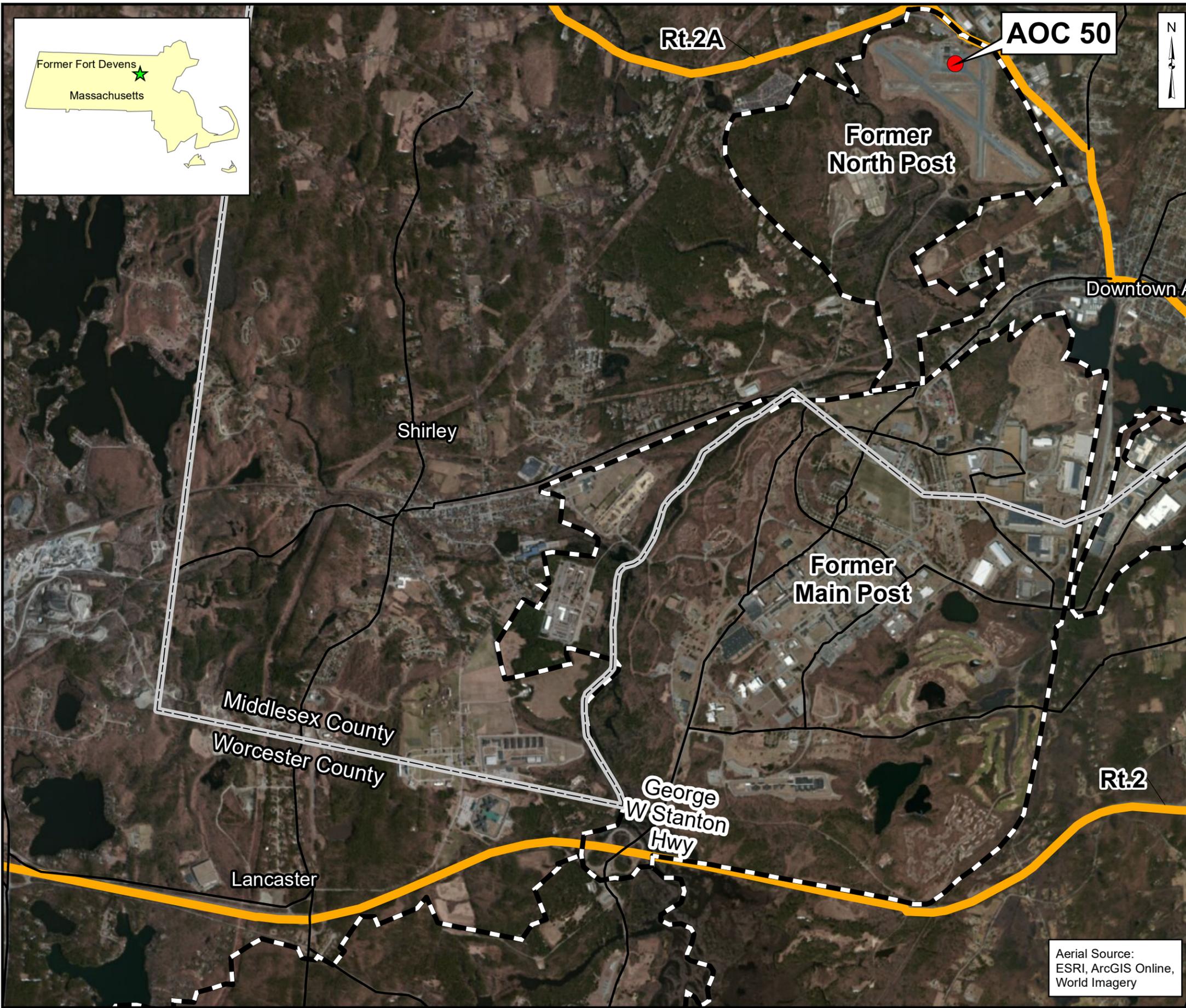
Table

Table 1
Type and Location of Identified Debris
Final Debris Removal Activities Summary Report
Area of Contamination 50 - Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts

Point ID	Type	Quantity	Northing	Easting	Description	Debris Removed (Yes/No)?
DB-1	Buried/Surface Debris	>10	4717151.523	285793.172	20' x 30' area of surface and shallow buried debris. Numerous cans, bottles, brickwork, metal strapping, glass, and other miscellaneous debris	Yes, debris was removed. Brickwork was not removed.
CP-1	Car Part	1	4717162.478	285803.946	Miscellaneous car/machine parts and electrical cable	Yes
C-1	Container	1	4717104.458	285881.610	12" perforated metal can	Yes
C-2		1	4717111.126	285861.292	20" rusted metal can with handle	Yes
C-3		5	4717138.638	285796.651	Oil cans and 24" metal container	Yes
C-4		1	4717134.677	285770.149	Rusted metal can and lightbulb	Yes
C-5		3	4717094.549	285920.166	1-gallon rusted cans	Yes
DR-1	Drum	3	4717122.710	285894.856	55-gallon drum, 30-gallon galvanized metal trash can, and 5-gallon metal can	Yes
DR-2		2	4717115.978	285829.141	55-gallon drums	Yes
DR-3		5	4717130.941	285789.509	55-gallon drum, metal strapping, metals cans, oil can, and brick-lined chimney	Yes, metal debris was removed. Brick-lined chimney was not removed.
MD-1	Metal Debris	1	4717146.159	285854.788	Galvanized steel ductwork for an air handler system	Yes
MD-2		5	4717130.003	285908.994	5-gallon rusted empty oil can, metal funnel, and other miscellaneous metal debris	Yes
MD-3		7	4717087.137	285941.336	5 small metal cans, metal umbrella stand, and metal strapping	Yes
MD-4		6	4717111.833	285911.761	4 concrete-filled metal ammunition cans, burnt metal can (possible expired smoke cannister), and glass bottle	Yes
MP-1	Metal Pipe	1	4717122.480	285804.776	Metal fence post	Yes
MP-2		1	4717129.196	285770.352	1.5" metal pipe	Yes
MP-3		3	4717151.641	285831.515	3' x 4' piece of sheet metal and metal cans	Yes
MP-4		1	4717093.177	285902.213	Metal pipe	Yes
Hillside Debris Piles	Multiple	>10	4717050.677	285975.430	Wood construction debris and minor surface metal debris (cans, strapping) and blue tarp	Yes, minor surface metal debris (cans, strapping) and blue tarp were removed. Wood construction debris was not removed.

Figures

Path: T:_ENV\Devens_RFTA\Seed_Task_Order\MXDs\AOC50 - 2023\Figure 1 - AOC 50 Site Location.mxd User: SEifner Date: 10/15/2023



-  Former Fort Devens Boundary
-  AOC 50 (Former Moore Army Airfield)
-  County Line
-  Highway
-  Major Road

Note:
AOC = Area of Contamination



Debris Removal Activities Summary Report
Area of Contamination 50 - Debris Pile C
Former Fort Devens Army Installation
Devens, Massachusetts

Site Location

Aerial Source:
ESRI, ArcGIS Online,
World Imagery

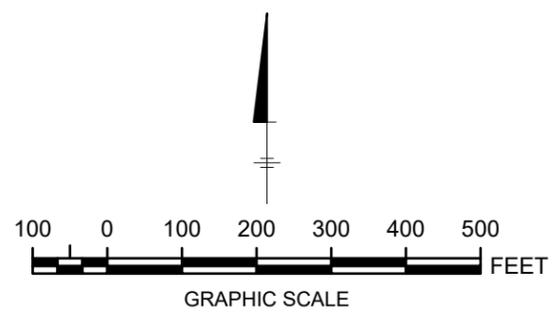


Figure 1

CITY: EAST GREENWICH, RI DIV/GROUP: ENV CREATED BY: SHARMAYH4948 LAST SAVED BY: SHARMAYH4948
 PROJECT: 30098081
 T:\ENVDEVENS_RFTAISEED_TASK_ORDER\APR\XIDEBRIS_AREAS\APR 4/27/2022 12:12 PM



- Legend
- Monitoring Well/Piezometer
 - ⊠ Debris Area
 - Containers
 - ▼ Metal Debris
 - Injection Well
 - Monitoring Well Converted to Injection Well
 - Possible Buried Metal
 - Geophysical Survey Boundaries



- Notes:
1. Site features are approximate
 2. AOC = Area of Contamination
 3. PCE = Tetrachloroethylene

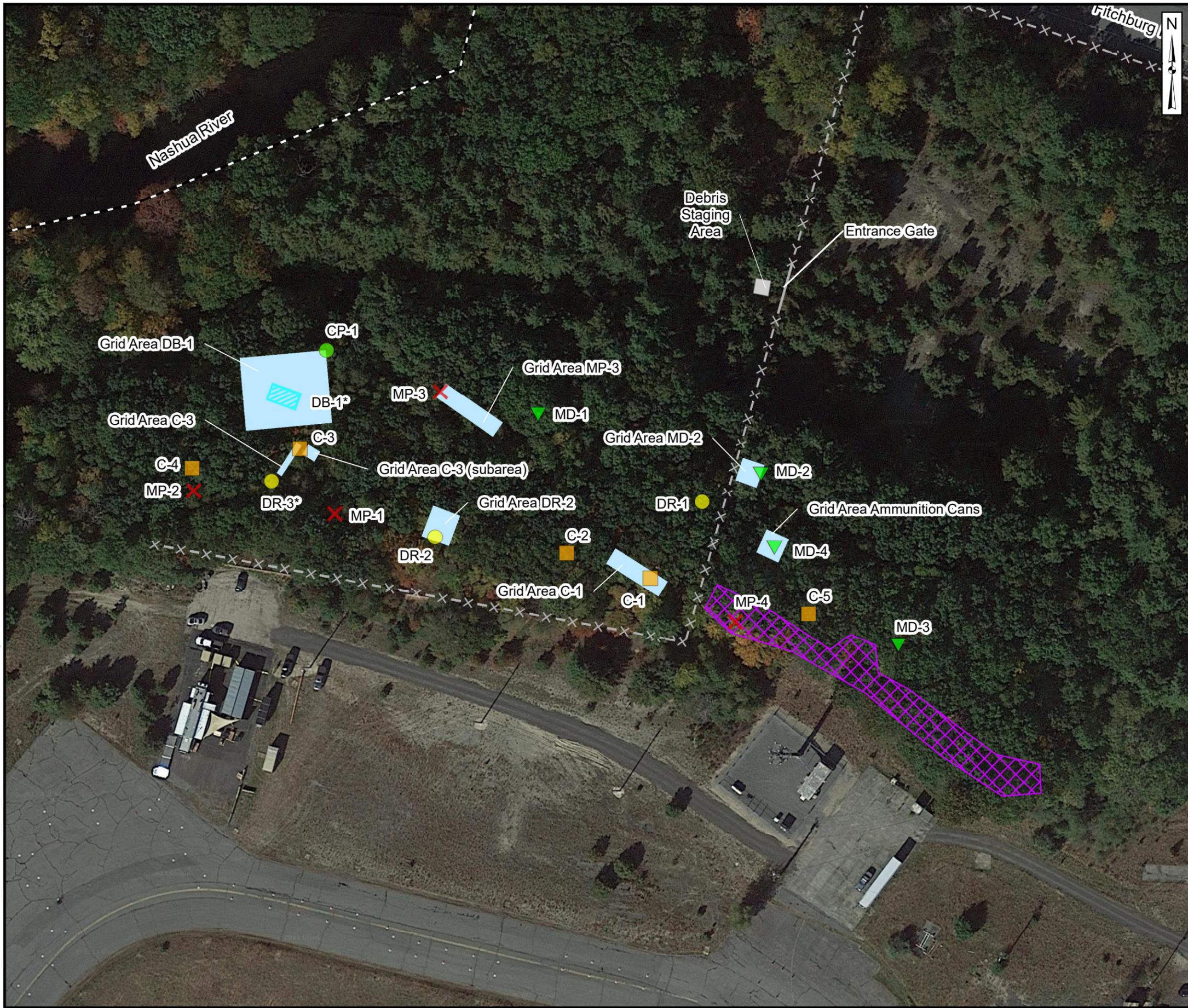
Debris Removal Activities Summary Report
 Area of Contamination - Debris Pile C
 Former Fort Devens Army Installation
 Devens, Massachusetts

AOC 50 Debris Piles



 a joint venture

Figure 2



Legend

- Former Fort Devens Boundary
- Surface Debris Area
- Car Part
- Metal Container
- Metal Drum
- Hillside Debris Piles*
- Metal Debris
- Metal Pipe
- Geophysical Survey Grid Boundary
- Debris Staging Area
- Fence

Notes:

1. DB = Surface Debris Area
2. CP = Car Part
3. C = Metal Container
4. DR = Metal Drum
5. MD = Metal Debris
6. MP = Metal Pipe
7. *Construction debris was not removed. Hillside Debris Piles contain wood construction debris; Location DB-1 contains brickwork; and Location DR-3 contains a brick-lined chimney.

0 100 200
FEET

Debris Removal Activities Summary Report
 Area of Contamination - Debris Pile C
 Former Fort Devens Army Installation
 Devens, Massachusetts

AOC 50 Debris Pile C Area



Figure 3

Appendix A

Photograph Log

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 1

Description:
Mixed debris – brickwork, cans, bottles, glass, and other miscellaneous debris at DB-1. Brickwork was not removed.

Location: AOC 50

Date: 6/21/2023



Photograph: 2

Description:
1.5" metal pipe (center of image) at MP-2

Location: AOC 50

Date: 6/21/2023



Photograph: 3

Description:

Crushed drum, metal cans, metal strapping, oil can, and brick-lined chimney at DR-3. Brick-lined chimney was not removed.

Location: AOC 50

Date: 6/21/2023



Photograph: 4

Description:

Temporary debris staging near DB-1

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 5
Description: Rusted metal can and lightbulb at C-4
Location: AOC 50
Date: 6/21/2023



Photograph: 6
Description: 3' x 4' sheet metal and metal cans at MP-3
Location: AOC 50
Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 7
Description:
Metal funnel at MD-2
Location: AOC 50
Date: 6/21/2023



Photograph: 8
Description:
Two 55-gallon drums
on hill slope at DR-2
Location: AOC 50
Date: 6/21/2023



Photograph: 9

Description:

Galvanized steel ductwork at MD-1

Location: AOC 50

Date: 6/21/2023



Photograph: 10

Description:

20-inch rusted metal can with handle at C-2

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 11

Description:
12-inch perforated
metal can at C-1

Location: AOC 50

Date: 6/21/2023



Photograph: 12

Description:
5-gallon metal can at
DR-1

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 13

Description:

55-gallon open-ended metal drum and 30-gallon galvanized metal trash can at DR-1

Location: AOC 50

Date: 6/21/2023



Photograph: 14

Description:

Burnt metal can (possible expired smoke cannister) at MD-4

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 15

Description:
Four concrete-filled metal ammunition cans and glass bottle at MD-4

Location: AOC 50

Date: 6/21/2023



Photograph: 16

Description:
Miscellaneous metal debris at DB-1

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 17

Description:
Collected debris placed
in roll-off container

Location: AOC 50

Date 6/21/2023



Photograph: 18

Description:
Four concrete-filled
metal ammunition cans
removed from MD-4

Location: AOC 50

Date 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 19

Description:

Empty waste oil drum removed from DR-2

Location: AOC 50

Date 6/21/2023



Photograph: 20

Description:

Hillside wood debris pile. Minor surface metal debris and blue tarp were removed. Wood construction debris was not removed.

Location: AOC 50

Date: 6/21/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 21
Description:
EM survey in Grid Area
DB-1
Location: AOC 50
Date: 7/27/2023



Photograph: 22
Description:
EM survey in Grid Area
C-3 and Grid Area C-3
(subarea)
Location: AOC 50
Date: 7/27/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 23

Description:

GPR survey in Grid Area MP-3. Survey equipment is in the center of the image in the distance.

Location: AOC 50

Date: 7/27/2023



Photograph: 24

Description:

EM survey in Grid Area DR-2. Note the steep terrain.

Location: AOC 50

Date: 7/27/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 25

Description:
Establishing
geophysical grid for
Grid Area C-1

Location: AOC 50

Date: 7/27/2023



Photograph: 26

Description:
Geophysical grid for
Grid Area Ammunition
Cans

Location: AOC 50

Date: 7/27/2023

Photograph Log
Final Debris Removal Activities Summary Report
Area of Contamination 50 – Debris Pile C
Former Fort Devens Army Installation, Devens, Massachusetts



Photograph: 27

Description:

Geophysical grid for
Grid Area MD-2

Location: AOC 50

Date: 7/27/2023

Appendix B

**Geophysical Survey Debris Pile Removal Report, Devens,
Massachusetts (HRGS, August 2023)**

GEOPHYSICAL SURVEY DEBRIS PILE REMOVAL REPORT DEVENS, MASSACHUSETTS

Prepared for:

Arcadis of New York, Inc.
855 Route 146, Suite 210
Clifton Park, New York 12065

Prepared by:

Hager-Richter Geoscience, Inc.
2 Industrial Way S/2
Atkinson, New Hampshire 03811

File 22SG13
August 2023

September 25, 2023

File: 22SG13

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Tel: (518) 250-7359
Fax: (518) 461-3145
Email: andy.vitolins@arcadis.com

RE: Geophysical Survey
Debris Pile Removal Report
Devens, Massachusetts

Dear Mr. Vitolins:

In this report, we summarize the results of a geophysical survey conducted by Hager-Richter Geoscience, Inc., (HRGS) at the above referenced site in Devens, Massachusetts for Arcadis in June 2023. As you may know, HRGS conducted similar geophysical surveys at the site in December¹, 2021. The scope of the survey and area of interest were specified by Arcadis.

INTRODUCTION

The site is a portion of the former Fort Devens military complex. The general location of the site is shown in Figure 1. As a part of a recent environmental investigation of the site by Arcadis, surface debris, including ammo cans, paint cans, and other metal objects were observed in areas of concern (AOCs) located south of Great Road at Devens, Massachusetts. Arcadis has requested a geophysical survey, including the electromagnetics, magnetics, and ground penetrating radar methods, to determine the extent of buried debris, if present, associated with the surface metal observed in the AOCs.

The approximate limits of the AOCs are shown in Figure 2. The AOCs are located within moderately wooded areas.

OBJECTIVE

The objective of the geophysical survey was to detect, and if detected, determine the extents of buried metal at the specified Point ID locations in areas of concern (AOCs) at the site.

¹ Geophysical Survey, AOC57, AOC50, and AOC74, Debris Pile Removal Work Plan, Devens, Massachusetts. HRGS Report, January 2022.

THE SURVEY

Peter Giger and Bryan Carnahan of HRGS conducted the geophysical survey on June 27, 2023. The project was coordinated with Ian Martz of Arcadis and Charlie Martin of Seres Engineering & Services, LLC (Seres). Charlie Martin was present during the survey and specified the AOCs. Prior to surveying, brush, branches, and logs were removed from the area of concern where possible. Location DR-2 was on a very steep slope.

The geophysical survey of the specified areas of concern was conducted using two (2) methods: time domain electromagnetic induction metal detection (EM61), and ground penetrating radar (GPR). EM61 and GPR were chosen as the primary methods for the survey in consultation with Seres because based on previous similar surveys conducted at the site, EM61 and GPR were the most useful methods for detecting small metallic objects, therefore, magnetics were not acquired at the site.

The EM data were acquired at approximately 8-inch intervals along lines spaced 5 feet apart across the accessible portions of the specified areas of interest. The EM survey detects buried metal. However, the EM method cannot provide information on the type of objects causing an EM anomaly.

GPR data were acquired along traverses oriented in two mutually perpendicular directions, with lines spaced 5 feet apart across the accessible portions of the areas of interest. The GPR method is capable of detecting both metal and nonmetal objects.

Data analysis and interpretation were completed at the HRGS offices. Original data and field notes will be retained in the HRGS files for a minimum of three years. The grid node locations were marked on site with labeled pin flags and their locations were surveyed with a Trimble Geox7 GPS system.

EQUIPMENT

EM. The EM survey was conducted using a Geonics EM61-MK2 time domain electromagnetic induction metal detector. The EM61-MK2 instrument was designed specifically for detecting buried metal objects such as utilities, underground storage tanks (USTs), and drums. An air-cored transmitter coil generates a pulsed primary magnetic field in the earth, thereby inducing eddy currents in nearby metal objects. The eddy current produces a secondary magnetic field that is sensed by two receiver coils, one coincident with the transmitter and one positioned 40 cm above the main coil. By measuring the secondary magnetic field after the current in the ground has dissipated but before the current in metal objects has dissipated, the instrument responds only to the secondary magnetic field produced by metal objects. Four channels of secondary response are measured in mV and are recorded on a digital data logger. The system is generally operated by pushing the coils configured as a wagon with an odometer mounted on the axle to trigger the data logger automatically at approximately 8-inch intervals.

GPR. The GPR survey was conducted using a GSSI SIR4000 digital subsurface imaging radar system. The system includes a survey wheel that triggers the recording of the data at fixed intervals, thereby ensuring the accuracy of the features detected along the survey lines. The system was used with 800

MHz and 300 MHz antennas. Data were recorded using 35 and 65 ns² time windows for the 800 MHz antenna and 300 MHz antenna, respectively.

GPR uses a high-frequency electromagnetic pulse (referred to herein as “radar signal”) transmitted from a radar antenna to probe the subsurface. The transmitted radar signals are reflected from subsurface interfaces of materials with contrasting electrical properties. Travel times of the radar signal can be converted to approximate depth below the surface by correlation with targets of known depths and by a curve matching routine. We monitor the acquisition of GPR data in the field and record the GPR data digitally for subsequent processing.

Data from the GPR survey were processed using RADAN 7.4 GPR processing software from Geophysical Survey Systems, Inc. We reviewed profile images of the GPR data. Interpretation of the records is based on the nature and intensity of the reflected signals and on the resulting patterns.

LIMITATIONS OF THE METHODS

HRGS MAKES NO GUARANTEE THAT ALL TARGETS WERE DETECTED IN THIS SURVEY. HRGS IS NOT RESPONSIBLE FOR DETECTING TARGETS THAT CANNOT BE DETECTED BY THE METHODS EMPLOYED OR BECAUSE OF SITE CONDITIONS. GPR SIGNAL PENETRATION MIGHT NOT BE SUFFICIENT TO DETECT ALL TARGETS.

EM. The EM61 cannot detect non-metallic objects. The data from an EM61 survey are adversely affected by surface metal. The EM61 has a depth sensitivity limited to about 10 feet. The instrument is relatively cumbersome and works best where the transmit and receive coils can be hand pushed in a small wagon.

Detection and identification should be clearly differentiated. Detection is the recognition of the presence of a metal object, and the electromagnetic method is excellent for such purposes. Identification, on the other hand, is determination of the nature of the causative body (i.e., what is the body -- a cache of drums, UST, automobile, white goods, etc.?). Although the EM data cannot be used to identify all buried metal objects, they provide excellent guides to the identification of some objects. For example, buried metal utilities produce anomalies with lengths many times their widths.

GPR. There are limitations of the GPR technique used to detect and/or locate targets such as those of the objectives of this survey. Limitations include: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical properties of the target and the surrounding soil, and (4) spacing of the traverses. Of these restrictions, only the last is controllable by us.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with snow piles, high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, especially inside

² ns, abbreviation for nanosecond, 1/1,000,000,000 second. Light and the GPR signal require about 1 ns to travel 1 ft in air. The GPR signal requires about 3.5 ns to travel 1 ft in unsaturated sandy soil.

buildings, and a target may not be detectable. The GPR method also commonly does not provide useful data under canopies found at some facilities.

The electrical conductivity of the ground determines the attenuation of the GPR signal and thereby limits the maximum depth of exploration. For example, the GPR signal does not penetrate clay-rich soils, and targets buried in clay might not be detected.

A definite contrast in the electrical conductivities of the surrounding ground and the target material is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to construction details or deeply corroded metal in the target, then the reflection may be too weak to recognize, and the target can be missed.

Spacing of the traverses is limited by access at many sites, but where flexibility of traverse spacing is possible, the spacing is adjusted to the size of the target. The GPR operator controls the spacing between lines, and the design of the survey is based on the dimensions of the smallest feature of interest. Targets with dimensions smaller than the spacing between GPR survey lines can be missed.

RESULTS

General. The geophysical survey was conducted using the EM61, and GPR methods across the accessible portions of the AOCs specified by Arcadis. No GPR data were acquired at DR-2 due to the very steep terrain. No EM data were acquired at MD-2 due to the chainlink fence along one edge of the area.

EM61. The EM61 data were acquired at approximately 8-inch intervals along survey lines spaced 5 to 10 feet apart across the accessible portions of the areas of interest. The spacing varied due to access limitations imposed by trees and brush. The results of the EM61 survey are shown in color contour form in Figures 3 through 6. The color contour interval is the same as was used for the EM61 data in our previous report to Arcadis dated January 17, 2022 (21SG06).

Interpretation of EM61 data is based on the relative response of the instrument in millivolts to local conditions. The instrument is not calibrated to provide an absolute measure of a particular property, such as the conductivity of the soil or the strength of the earth's magnetic field. Subsurface metal objects produce sharply defined positive anomalies when the EM61 is positioned directly over them. Acquiring data at short intervals along closely spaced lines, as was done where possible at the subject site, provides high spatial resolution of the location and footprint of the targets. Thus, buried metal is recognized in contour plots of EM61 data by positive anomalies with spatial dimensions roughly corresponding to the dimensions of the buried metal.

Several moderate-to high-amplitude EM anomalies (green to red areas in Figures 3, 4, 5 and 6) are present in the AOCs and are inferred to have been caused by buried metal. These moderate- to high-amplitude EM anomalies are shown as black stippled areas in the interpretation Figures 3, 4, 5, and 6. We note that the size and amplitude of one EM anomaly in DB-1 area is large enough to be caused by drums, caches of drums, or other metal debris.

GPR Survey and Interpretation. Apparent GPR signal penetration in most areas at the site was average, with GPR two-way travel time reflections received from 40 ns of the 65 ns time window for the 300 MHz

antenna and from 20 ns of the 35 ns time window for the 800 MHz antenna. Based upon site-specific time-to-depth conversions for the GPR signal, the GPR signal penetration in most areas is estimated to have been about 6.5 feet for the 300 MHz antenna and 3.3 feet for the 800 MHz antenna.

GPR reflections typically were not detected at EM anomalies. This may be because a shallow, small metal object will only be detected by the GPR method if the antenna passes directly over it, whereas the same object may be detected by the EM method even if the instrument passes to the left or right of the object.

A few short GPR linear objects were detected and are shown in Figures 3, 4, 5, and 6. They represent non-metallic objects, because no EM anomaly correlates with these GPR linear objects. They may represent PVC piping, or more likely tree roots. One well defined GPR flat reflector was detected in DB-1 area and is shown in Figure 3. This may represent soil layering or layered bricks.

GPR reflections characteristic of small unidentified buried objects (no larger than about 2 feet wide) were detected in portions of the AOCs. The locations of such small buried objects are shown as small black "X"s in Figures 3, 5, and 6. Most such small objects were located outside of areas of buried metal and may represent bricks, cobbles, or roots.

CONCLUSIONS

Based upon the geophysical survey conducted by HRGS at the former Fort Devens military complex located at in Devens, Massachusetts for Arcadis in June 2023, we conclude:

- Only few areas of buried metal objects or caches of objects are present in the areas of concern, in areas DB-1, C-3, DR-2, and C-1. It cannot be determined whether such objects are drums or USTs based on the geophysical data.
- Four areas, C-3(subarea), MP-3, MD-2, and ammo can have no significant amounts of buried metal.
- Small unidentified buried objects and possible utility segments or linear structures are present in the AOCs.

LIMITATIONS ON USE OF THIS REPORT

This letter report was prepared for the exclusive use of Arcadis (Client). No other party shall be entitled to rely on this Report, or any information, documents, records, data, interpretations, advice, or opinions given to Client by Hager-Richter Geoscience, Inc. (HRGS) in the performance of its work. The Report relates solely to the specific project for which HRGS has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project, or any other purpose without the express written permission of HRGS. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to HRGS.

HRGS has used reasonable care, skill, competence, and judgment in the performance of its services for this project consistent with professional standards for those providing similar services at the same time,

in the same locale, and under like circumstances. Unless otherwise stated, the work performed by HRGS should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

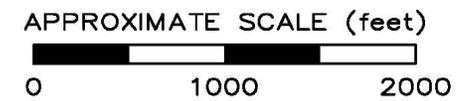
Except as expressly provided in this limitations section, HRGS makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed. If you have any questions or comments on this letter report, please contact us at your convenience. It has been a pleasure to work with Arcadis on this project. We look forward to working with you again in the future.

Sincerely yours,
HAGER-RICHTER GEOSCIENCE, INC.



Peter Giger
Geophysicist

Attachments: Figures 1 - 6



NOTE:

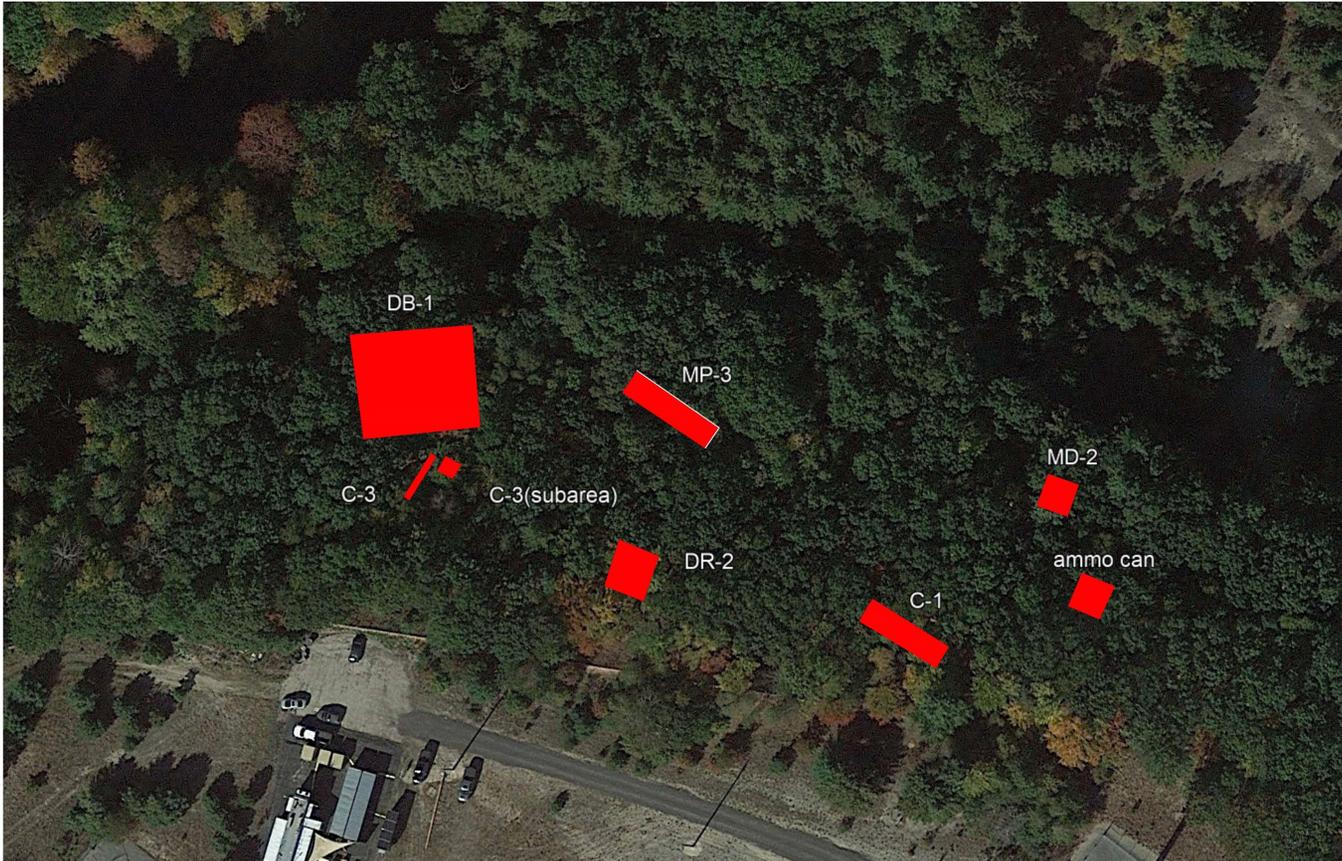
Modified from Google Earth Pro aerial photograph.

Figure 1
 General Site Location
 AOC50
 Debris Pile Removal Report
 Devens, Massachusetts

File 22SG13

August, 2023

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LEGEND



APPROXIMATE LIMITS
OF GEOPHYSICAL
SURVEY AREAS

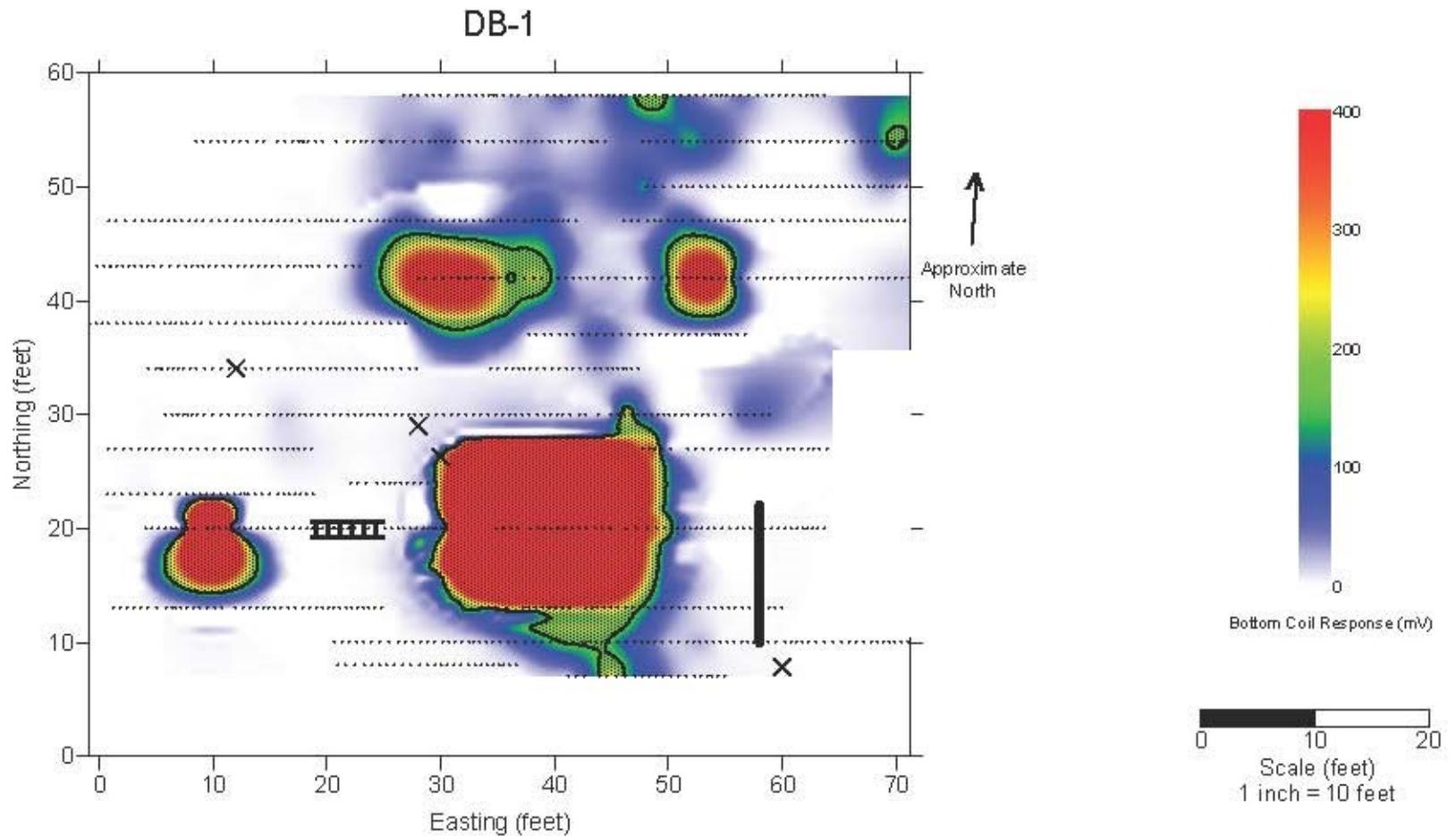
Figure 2
Survey Locations
Debris Pile Removal Report
Devens, Massachusetts

File 22SG13

August, 2023

HAGER-RICHTER
Salem, NH | Fords, NJ

Note: Modified from Google Earth aerial photograph.

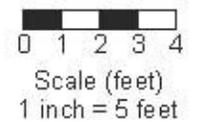
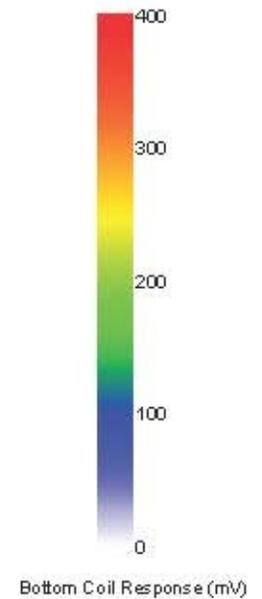
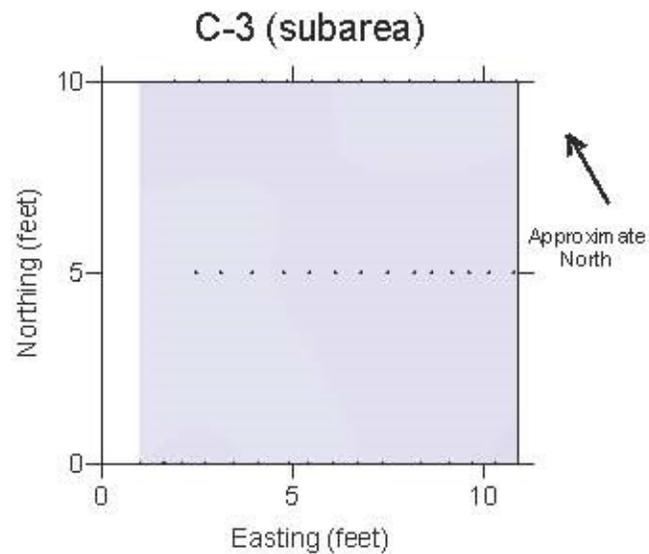
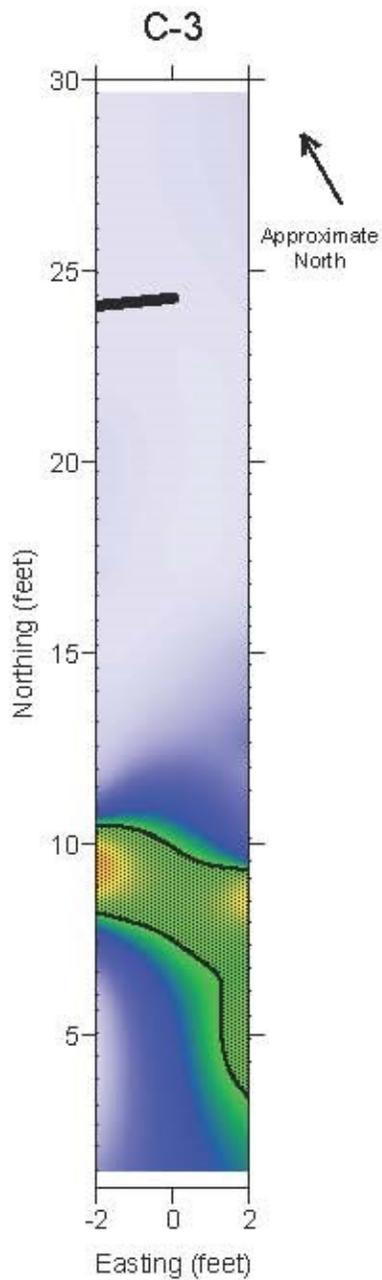


LEGEND

-  POSSIBLE LINEAR OBJECT
-  UNIDENTIFIED BURIED OBJECT
-  AREA OF POSSIBLE BURIED METAL
-  EM DATA STATION
-  FLAT REFLECTOR

Figure 3
DB-1 Integrated Interpretation
Debris Pile Removal Report
Devens, Massachusetts

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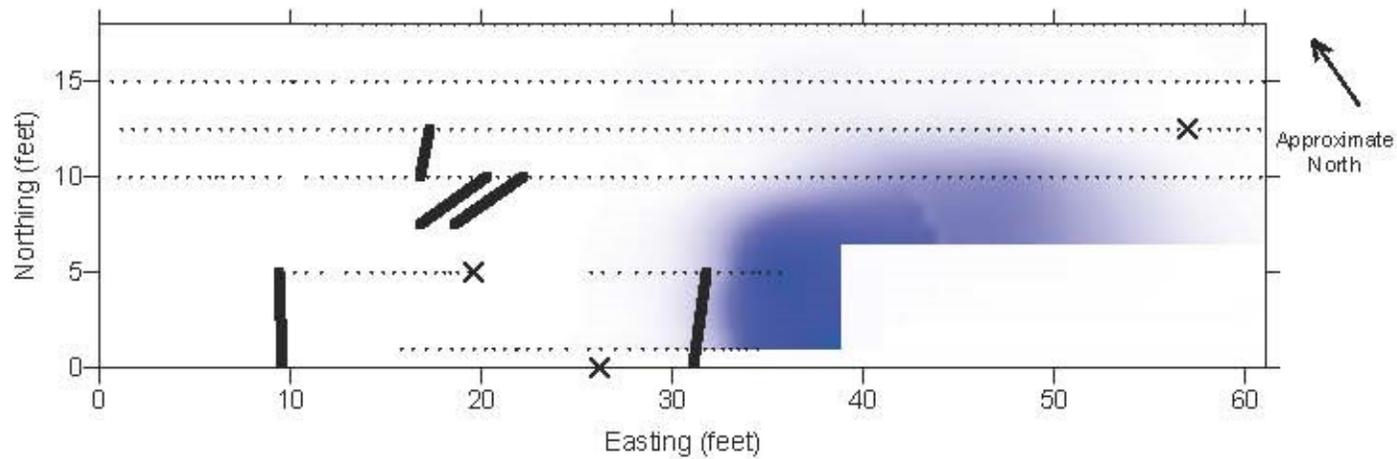
LEGEND

-  POSSIBLE LINEAR OBJECT
-  UNIDENTIFIED BURIED OBJECT
-  AREA OF POSSIBLE BURIED METAL
-  EM DATA STATION
-  FLAT REFLECTOR

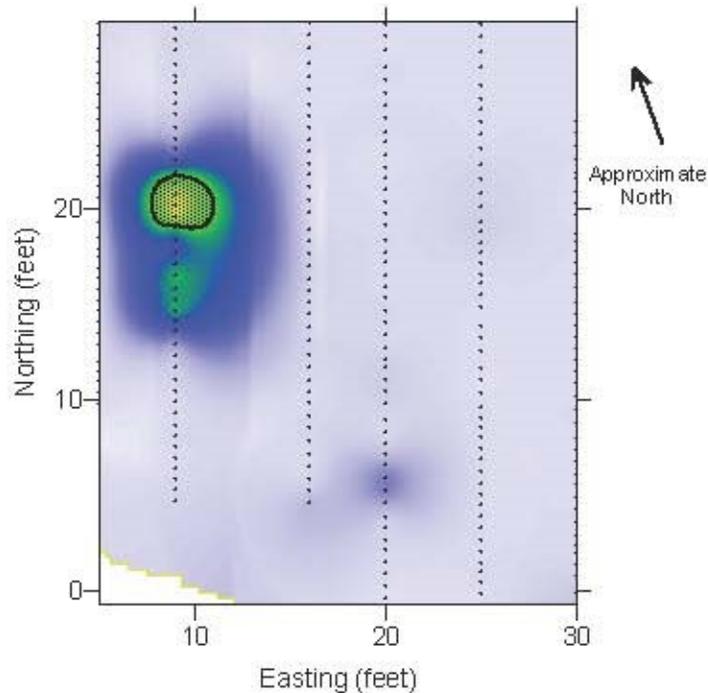
<p>Figure 4 C-3 Integrated Interpretation Debris Pile Removal Report Devens, Massachusetts</p>	
File 22SG13	August, 2023
<p>HAGER-RICHTER Salem, NH Fords, NJ</p>	

Note: No targets detected in C-3 (subarea).

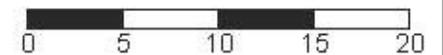
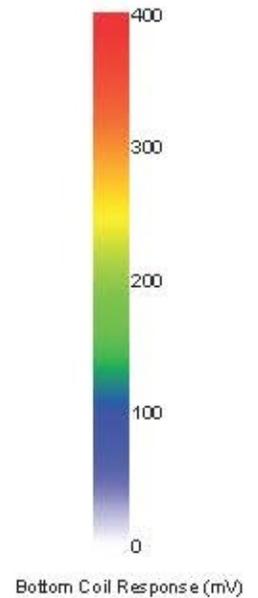
MP-3



DR-2



Note: No GPR at DR-2 due to steep slope.



Scale (feet)
1 inch = 10 feet

LEGEND

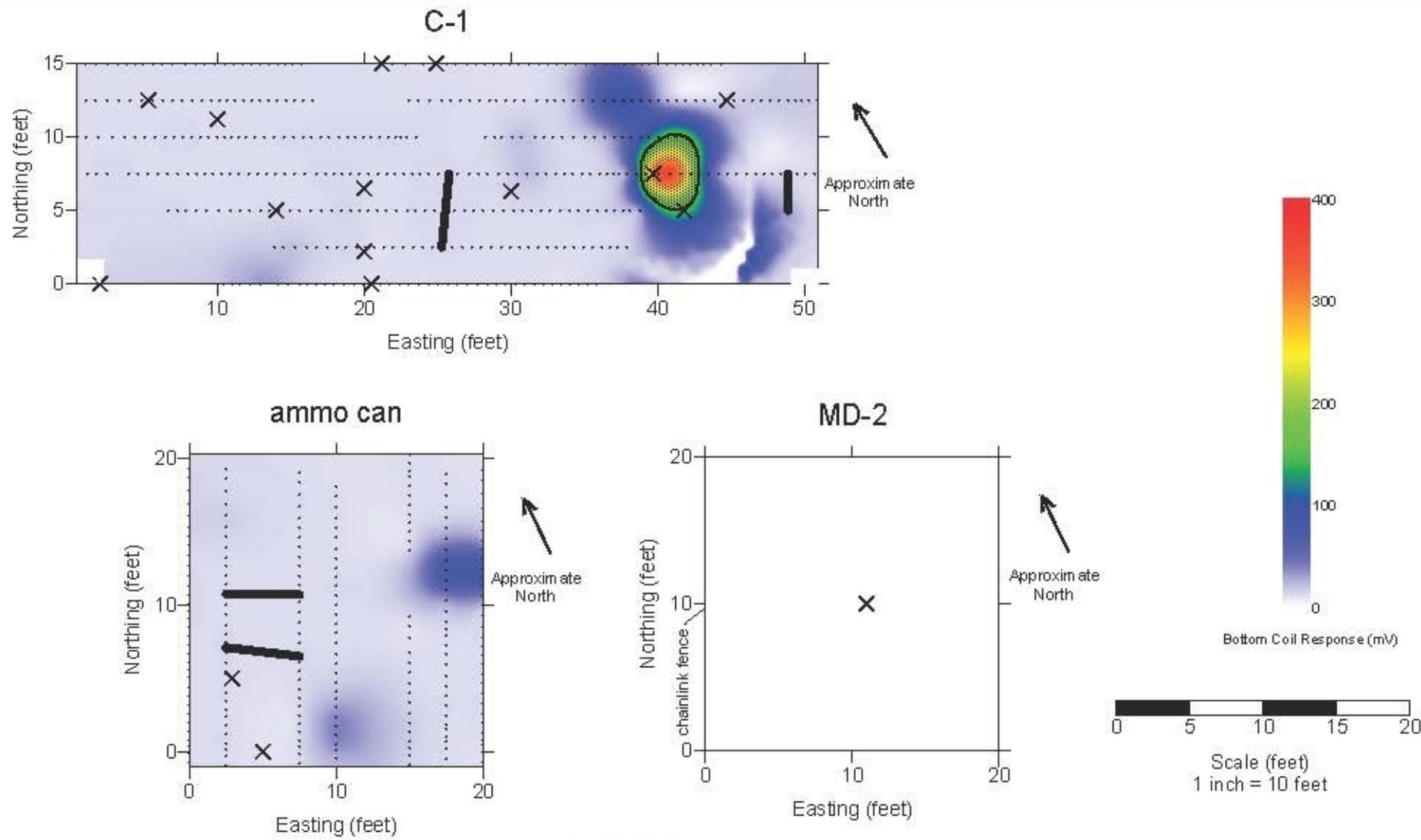
-  POSSIBLE LINEAR OBJECT
-  UNIDENTIFIED BURIED OBJECT
-  AREA OF POSSIBLE BURIED METAL
-  EM DATA STATION
-  FLAT REFLECTOR

Figure 5
MP-3 & DR-2 Integrated Interpretation
Debris Pile Removal Report
Devens, Massachusetts

File 22SG13

August, 2023

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- LEGEND**
-  POSSIBLE LINEAR OBJECT
 -  UNIDENTIFIED BURIED OBJECT
 -  AREA OF POSSIBLE BURIED METAL
 -  EM DATA STATION
 -  FLAT REFLECTOR

Figure 6
 C-1, ammo, & MD-2 Integrated Interpretation
 Debris Pile Removal Report
 Devens, Massachusetts

File 22SG13	August, 2023
HAGER-RICHTER Salem, NH Fords, NJ	

Note: No EM61 data at MD-3 due to nearby surface metal (chainlink fence).

Appendix C

Waste Disposal Documentation

Fw: Off-Site Rule Questions with Respect to Metal Debris

Heather Levesque <halevesque@seres-es.com>

Tue 10/3/2023 2:44 PM

To: Heather Levesque <halevesque@seres-es.com>

From: O'Brien, Conor <OBrien.Conor@epa.gov>**Sent:** Tuesday, December 7, 2021 8:05 AM**To:** Reddy, Penelope W CIV USARMY CENAE (USA) <PENELOPE.W.REDDY@usace.army.mil>**Cc:** Vitolins, Andy <Andy.Vitolins@arcadis.com>**Subject:** [Non-DoD Source] RE: Off-Site Rule Questions with Respect to Metal Debris

Hi Penny,

So long as the scrap metal does not contain any CERCLA hazardous substances, pollutants, or contaminants it would not be covered under the off-site rule and so you would not have to obtain approval under the off-site rule for any shipments of that waste stream. I will note that, to meet this definition, a waste does not have to meet the definition of a RCRA hazardous waste as the threshold is much lower in terms of contamination. If you find that the off-site rule should apply to the stream (i.e. that it was contaminated with the contaminants in the subsurface), you would have to submit a request and make sure that the receiving facility is permitted to deal with the stream. Hopefully this was helpful to you and have a nice rest of your week.

Best,

Conor O'Brien

From: Reddy, Penelope W CIV USARMY CENAE (USA) <PENELOPE.W.REDDY@usace.army.mil>**Sent:** Monday, December 6, 2021 5:23 PM**To:** O'Brien, Conor <OBrien.Conor@epa.gov>**Cc:** Vitolins, Andy <Andy.Vitolins@arcadis.com>**Subject:** Off-Site Rule Questions with Respect to Metal Debris

Dear Mr. O'Brien,

At the request of the USEPA Region 1, the Army has recently concluded the removal of surficial metal debris associated with historical Army activities at three areas of the Former Fort Devens. The debris consisted of ferrous metals in the form of empty drums, empty paint cans, sheet metal, and wheels (from former military vehicles). Approximately 5 cubic yards of the debris were collected and placed in a roll-off container. No indications of spills or the presence of potentially hazardous compounds associated with the debris were noted during the debris removal. The three areas where the work was conducted are co-located with Areas of Concern (AOCs) listed under the Fort Devens CERCLA ROD (AOCs 57, 74, and 31) due to the presence of contaminants in the subsurface; however, the debris is not believed to be associated with the contamination at those AOCs.

Given this information, the Army would like to clarify if the debris is subject to the Off-Site Rule since it is not thought to be associated with a CERCLA-regulated cleanup site. Further, if the off-site rule is applicable, would it be acceptable to recycle the debris at the Devens Recycling Center, or does it have to be disposed at a permitted landfill facility?

We appreciate your time in reviewing this request. Please contact me if you have any questions or would like to discuss further.

Thanks, Penny

Penelope Reddy

U.S. Army Corps of Engineers

696 Virginia Road

Concord, MA

978-318-8160

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SITE
 Devens Recycling Center 978-772-6500
 45 Independence Dr Devens, MA 01434

CUSTOMER
 000999
 Cash Customer
 45 Independence Drive
 Devens, MA 01434
 Contract:Cash Customer

SPE DR	TICKET # 130957	CELL
WEIGHMASTER Derek P.		
DATE/TIME IN 6/22/23 10:11 am		DATE/TIME OUT 6/22/23 10:36 am
VEHICLE CA1		CONTAINER
REFERENCE DEVENS TANTARA ENVIRONMENTAL		
BILL OF LADING		

SCALE IN GROSS WEIGHT	19,500	NET TONS	0.48	INBOUND
SCALE OUT TARE WEIGHT	18,540	NET WEIGHT	960	CASH

QTY.	UNIT	DESCRIPTION	RATE	EXTENSION	TAX	TOTAL
0.00	YD	Tracking QTY				
0.48	tn	C&D	\$313.29	\$313.29	\$0.00	\$313.29

Thank you for your business!

Payment (s)
 CREDIT CARD-SCALE \$313.29

NET AMOUNT \$313.29
TENDERED \$0.00
CHANGE \$0.00
CHECK#

The undersigned individual signing this document on behalf of Customer acknowledges that he or she has read and understands the terms and conditions on the reverse side and that he or she has the authority to sign this document on behalf of the customer.

SIGNATURE _____

Appendix D

Responses to Comments



Project Name: Former Fort Devens Army Installation			
Location: Devens, Massachusetts		Reviewers: Shawn Lowry (USEPA) and Joanne Dearden (MassDEP)	
Document Name: <i>Draft Debris Removal Activities Summary Report, Area of Contamination 50 – Debris Pile C, Former Fort Devens Army Installation, Devens, Massachusetts, October 2023</i>			
Prepared By: Seres-Arcadis 8(a) JV			
No.	Ref. Page / Para.	COMMENT	RESPONSE
Shawn Lowry (USEPA) – December 1, 2023			
1.	General	The geophysical Survey report (Appendix B) identified several anomalies in the subsurface, including one area in DB-1 that “is large enough to be caused by drums, caches of drums, or other metal debris” (PDF page 36). Army did not propose follow up actions to identify or characterize this material; please provide justification in the text.	As noted in the Work Plan Addendum, the objectives of this work were to remove identified debris to visual limits, document the debris removal actions, and document areas of remaining debris that could not be removed. These objectives were accomplished. A brief statement indicating the objectives of the Work Plan Addendum were achieved has been added to Section 4.
2.	General	Table 1 notes that some surface items were not removed, including construction debris and a brick chimney of unknown origin and use. Please provide justification in the text and add these items to Figure 3.	As noted in the Work Plan Addendum, construction debris such as concrete, brick, or wood would not be removed and would be left in place. The areas where construction debris was left in place have been noted in Table 1, Figure 3, and Appendix A.
3.	PDF Page 7	The text notes, “no confirmatory soil sampling was conducted during the debris removal activity”. Please provide justification for this choice considering the nature of materials found, including but not limited to structurally failing drums, oil cans, construction debris, a brick chimney of unknown origin and use, and the presence of uncharacterized buried metal and other materials.	Removed materials such as rusted and/or empty drums, oil cans, and other miscellaneous containers were visually inspected for contents prior to removal. Individual containers were also screened for organic vapors using a RAE Systems MultiRAE Plus air quality monitoring instrument. No detectable organic vapors were noted at any of the container locations, and no container contents were available to be sampled for confirmation purposes. Soil in the vicinity of removed containers were visually inspected and checked for organic vapors at the ground surface beneath the container. No visual soil staining, odors, or detectable organic vapors were noted at any of the container locations. The text in Section 3.2.2 has been revised to indicate the above determination for no confirmatory sampling.



No.	Ref. Page / Para.	COMMENT	RESPONSE
4.	PDF Page 9	The text notes, "Based upon field screening, the surficial material collected during the removal process was determined to be nonhazardous and suitable for disposal at a regulated facility accepting non-hazardous waste". Please explain what is meant by "field screening" and add a discussion of equipment and methods to the text.	Field screening was conducted using a RAE Systems MultiRAE Plus air quality monitoring instrument, calibrated to register concentrations of common industrial organic chemicals in air/soil. This, combined with visual and olfactory assessment, were the primary tools used in the field screening process. A discussion of the equipment and methods has been added to Section 3.2.2.
		Joanne Dearden (MassDEP) – December 4, 2023	
N/A	N/A	MassDEP does not have any additional comments beyond what EPA has already submitted.	N/A
		END OF COMMENTS	